

Assessment of knowledge, attitude, and practice among dental students toward antibiotic usage and development of antimicrobial resistance – A cross-sectional study

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Abstract

Aims and Objective: This study was designed to assess of knowledge, attitude, and practice among dental student toward antibiotic usage and development of antimicrobial resistance. **Material and Methods:** Study comprises 120 subjects. The data were obtained using a self-administrated questionnaire comprising 21 multiple choice questions (Q1-Q21) based on Likert scale (3 point) that includes questions on knowledge, attitude, and practice toward antibiotics usage and development of antimicrobial resistance. Pearson correlation was used for statistical analysis. **Results:** A majority of participants 81.7% were aware of antibiotic resistance. A high percentage of this study participant were prescribing antibiotics for conditions such as periodontal abscess drainage (81.7%), after RCT (32.5%), after scaling and root planning (27.5%), uneventful tooth extraction (30.8%), and only (40%) prescribe antibiotics to treat diabetic patients for dental procedures. **Conclusion:** This study concludes that dental students may prescribe antibiotics inappropriately to manage various conditions when not indicated. This may indicate a defect in education of students with regard to current antibiotic guidelines.

Introduction

Antibiotic resistance of micro-organism is defined as micro-organism as environmentally and genetically adopted which is not responded by systemic concentration of an antimicrobial agent with normal dosage schedule or by fall in the minimum inhibitory concentration range. Alexander Fleming in 1945 concluded about the danger of Resistance “it is not difficult to make microbes resistance to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body... and by exposing microbes to nonlethal quantities of the drug make them resistant.”^[1]

In modern dentistry antibiotic is used in different aspect as both prophylactic and therapeutic treatment modalities in many systemic immunosuppressives condition. Furthermore, in general, dental practice before or after surgical procedures and infection control. According to the researchers, the resistance to antibiotics is increasing at a faster pace that it can be controlled.

AS we known that each antibiotic has unfavorable adverse effects in CNS, CVS, GIT, even fatal anaphylactic shock, and other disturbance. Without guideline and irrational use of antibiotics are main causes to the development of antibiotic resistance. The rate at which bacteria develop resistance is alarming. Microbial resistance not only effects the person taking drug but also these resistance genes can pass genetically to next generation as well contacts to other personal, environmentally, and animal refuse. The prevalence of the dental diseases is associated with local factor mainly dental plaque, mechanical scaling, and root planning causes of reduce the need for prescribing antibiotics. In other way, proper diagnosis and treatment based on the evidence-based dentistry also help to avoid the indiscriminate use of antibiotics.

Hence, the dentist should improve the clinical skill as well as practicing of antibiotic to decrease the incidence of antibiotic resistance. Therefore, this survey has been conducted to assess the same.

Material and Methods

Study comprised 120 subjects including undergraduate and postgraduate students in different dental colleges in Bengaluru. The study was approved by the Institutional Ethical Committee. The data were obtained using a self-administered questionnaire comprising of 21 multiple choice questions (Q1-Q21) based on Likert scale (3 point) that included questions on knowledge, attitude, and practice toward antibiotic usage and development of antimicrobial resistance. The questionnaire was personally distributed among the students and also explained about the importance of this survey and how to complete the questionnaire by confidential responses.

Questionnaire

Three-point Likert scale: (1) Yes, (2) No, (3) Don't know.

Statistical analysis

Tables 1-4 are given about Knowledge, attitude, practice, and results respectively. All the data were collected, each of the questionnaire responses was examined. After that data were analyzed by the relation among knowledge, attitude, and practice was done using Pearson's correlation.

Discussion

In modern based medicine many systemic review and study concluded irrational and overused of antibiotics is a well-established reason for antibiotic resistance by emergence of virulent strains or genetically modify of microorganism which is less susceptible of antibiotic.

This study assessed the knowledge, attitude, and practice toward antibiotic usage and development of antimicrobial resistance among dental students in Bengaluru.

It was noted that on an average, 81.7% of the participants were aware of antibiotic resistance. Similarly, a study conducted by Martinavallin *et al.* in (2013) with Swedish population, concluded that 94% of the responders were aware about the antibiotic and antibiotic resistance. Holloway and Dijk in 2011 in their study conclude that lack of knowledge on proper doses, duration, and frequency and diagnosis of the diseases were main reason causes of development of antimicrobial resistance.^[2]

In the present study, 50.8% of the participants were aware of dosage and course in antibiotic prescriptions where in 59% of students aware of overuse and misuse of antibiotics lead to resistance. This present study supported by Accra, Ghana in 2012 which revealed that only 49% of the students were not aware about the medical implications of irrational use of antibiotics due to lack of knowledge and 46% not knowing about the full course of the antibiotic.^[3]

In the present study also noted that 54.2% responders were knowing about antibiotics have side effects. However, only 57.5% knew that Azithromycin is antibiotic of choice for patients with penicillin allergy. This result showed that majority of the student were not even considered about allergy reaction before

Table 1: Knowledge

Questions	Options
Do you know about antibiotic resistance?	Yes/No/Don't know
Reduced the efficacy of antibiotic if a full course of antibiotic dosage regimen is not followed?	Yes/No/Don't know
Over use and misuse of the antibiotics can promote the growth of antibiotic resistant bacteria	Yes/No/Don't know
Antibiotics may induce an allergic reaction and side effects?	Yes/No/Don't know
Do you usually check the expiry date of the antibiotic before using it?	Yes/No/Don't know
Azithromycin is antibiotic of choice for patients with penicillin allergy?	Yes/No/Don't know
Use of tetracycline during teeth mineralization can cause permanent brown staining of teeth?	Yes/No/Don't know

Table 2: Attitude

Questions	Options
Do you take past dental/medical history of consumption of antibiotics before prescribing antibiotics?	Yes/No/Don't know
Do you feel antibiotic prescription is absolutely necessary to manage oral diseases?	Yes/No/Don't know
Do you keep yourself updated by reading any latest scientific material before the use of antibiotics in dentistry?	Yes/No/Don't know
Do you prescribe antibiotics depending on its cost?	Yes/No/Don't know
Have you ever prescribed antibiotics to patients without prior antibiotic sensitivity testing?	Yes/No/Don't know
Do you think one dose of prophylactic antibiotic before dental implant placement is recommended?	Yes/No/Don't know
Do you fear the spread of odontogenic infection just because you have not prescribed antibiotics?	Yes/No/Don't know

Table 3: Practice

Questions	Options
Do you prescribe antibiotics after periodontal abscess drainage?	Yes/No/Don't know
Do you give prophylactic dose of antibiotic in patients with prosthetic valve before supragingival scaling?	Yes/No/Don't know
Do you prescribe antibiotics after root canal treatment?	Yes/No/Don't know
Do you prescribe antibiotics after scaling and root planning?	Yes/No/Don't know
Do you prescribe antibiotics after uneventful tooth extraction?	Yes/No/Don't know
Do you prescribe antibiotics to treat diabetic patients for dental procedures?	Yes/No/Don't know
Do you prescribe recommended safe antibiotics for pregnant woman for dental procedures?	Yes/Do/Don't know

Table 4: Results

Questions	Frequency	Percentage
Do you know about antibiotic resistance?		
Yes	98	81.7
No	11	9.2
Don't know	11	9.2
Total	120	100.0
Reduced the efficacy of antibiotic if a full course of antibiotic dosage regimen is not followed?		
Yes	61	50.8
No	49	40.8
Don't know	10	8.3
Total	120	100.0
Over use & misuse of the antibiotics can promote the growth of antibiotic resistant bacteria		
Yes	71	59.2
No	44	36.7
Don't know	5	4.2
Total	120	100.0
Antibiotics may induce an allergic reaction & side effects?		
Yes	65	54.2
No	47	39.2
Don't know	8	6.7
Total	120	100.0
Do you usually check the expiry date of the antibiotic before using it?		
Yes	57	47.5
No	56	46.7
Don't know	7	5.8
Total	120	100.0
Azithromycin is antibiotic of choice for patients with penicillin allergy?		
Yes	69	57.5
No	40	33.3
Don't know	11	9.2
Total	120	100.0
Use of tetracycline during teeth mineralization can cause permanent brown staining of teeth?		
Yes	71	59.2
No	33	27.5
Don't know	16	13.3
Total	120	100.0
Do you take dental/medical history of consumption of antibiotics before prescribing antibiotics?		

(Contd...)

Table 4:(Continued)

Questions	Frequency	Percentage
Yes	89	74.2
No	26	21.7
Don't know	5	4.2
Total	120	100.0
Do you feel antibiotic prescription is absolutely necessary to manage oral diseases?		
Yes	53	44.2
No	60	50.0
Don't know	7	5.8
Total	120	100.0
Do you keep yourself updated by reading any latest scientific material prior to the use of antibiotics in dentistry?		
Yes	49	40.8
No	63	52.5
Don't know	8	6.7
Total	120	100.0
Do you prescribe antibiotics depending on its cost?		
Yes	33	27.5
No	72	60.0
Don't know	15	12.5
Total	120	100.0
Have you ever prescribed antibiotics to patients without prior antibiotic sensitivity testing?		
Yes	65	54.2
No	49	40.8
Don't know	6	5.0
Total	120	100.0
Do you think one dose of prophylactic antibiotic before dental implant placement is recommended?		
Yes	68	56.7
No	38	31.7
Don't know	14	11.7
Total	120	100.0
Do you fear the spread of odontogenic infection just because you have not prescribed antibiotics?		
Yes	72	60.0
No	44	36.7
Don't know	4	3.3
Total	120	100.0
Do you prescribe antibiotics after periodontal abscess drainage?		

(Contd...)

Table 4: (Continued)

Questions	Frequency	Percentage
Yes	98	81.7
No	16	13.3
Don't know	6	5.0
Total	120	100.0
Do you give prophylactic dose of antibiotic in patients with prosthetic valve before supragingival scaling?		
Yes	47	39.2
No	71	59.2
Don't know	2	1.7
Total	120	100.0
Do you prescribe antibiotics after root canal treatment?		
Yes	39	32.5
No	81	67.5
Total	120	100.0
Do you prescribe antibiotics after scaling and root planning?		
Yes	33	27.5
No	79	65.8
Don't know	8	6.7
Total	120	100.0
Do you prescribe antibiotics after uneventful tooth extraction?		
Yes	37	30.8
No	76	63.3
Don't know	7	5.8
Total	120	100.0
Do you prescribe antibiotics to treat diabetic patients for dental procedures?		
Yes	48	40.0
No	63	52.5
Don't know	9	7.5
Total	120	100.0
Do you prescribe recommended safe antibiotics for pregnant woman for dental procedures?		
Yes	57	47.5
No	26	21.7
Don't know	37	30.8
Total	120	100.0

prescribing the antibiotic which is very hopeless situation. Similarly, studies conducted by Ling Oh *et al.* in 2011,^[4] Shehadeh *et al.* in 2012,^[5] and Mouhieddine *et al.* in 2015,^[6] based on knowledge, attitude, and behavior toward antibiotics

use and misuse where the percentage of respondents were found 53.9%, 69.6%, and 66.7%, respectively.

Tetracycline prescribing during pregnancy, breastfeeding, or individuals which were younger than 12 years may led to intrinsic gray or red-brown discoloration in permanent teeth.^[7] Our study concluded that 59.2% students were of the use of tetracycline during teeth mineralization can cause permanent brown staining of teeth. Similar study was done by Nedal *et al.* in 2017, Saudi Arabia where only (27.3%) were aware of tetracycline uses in children led to brownish teeth and knowledge about the antibiotic prescribing is high risk during pregnancy and breastfeeding is 56.7% (pregnancy) and 49.8% (breastfeeding), respectively.

Our present study shows that 74.2% dental students know to take past medical and dental history for prescribing antibiotics. Similarly, a study conducted by Saini *et al.* in 2014 concluded that antibiotics prescribe should be based on patients medical and dental status as well as microbiological analysis.^[8]

In recent year in our dental practice's antibiotic is usually advice in acute odontogenic and non-odontogenic infections. Furthermore, in prophylactic in many systemic diseases, focal infection in like endocarditis and joint prostheses; even in surgical post-operative aspect. So carefully rational antibiotic use should be considered to get minimizing the side effects and the appearance of resistances with maximum efficacy.^[9]

Our present study results show that 65.8% were aware of antibiotics are required after scaling, 56.7% of prophylactic use of antibiotic before dental implant placement, and 81.7% after periodontal abscess drainage. Furthermore, 32.5% were indicated after root canal treatment and 63.3% aware about not indicated after uneventful extraction. Similar study conducted by Saini *et al.*^[10] 2014 among the dentist in different clinical dental aspect uses of antibiotic and the result obtained 60% during RCT; 18% before scaling; 8% after scaling; 40% after root planning; 94% after abscess drainage; 86% after periodontal surgery; 76% single tooth extraction; 96% impacted tooth; and 86% implant placement.

This result concluded that dental practitioners have higher awareness compared to dental students but still both study respondents have insufficient knowledge about antibiotic used in dental practice.

Furthermore, in our study, we found that only 40.0% of students were aware that antibiotics is indicated in diabetic patients after dental treatment and 47.5% of students were aware of prescribing safe antibiotics during pregnancy. Similarly, a study conducted by Nedal *et al.* in 2014 that only 64% were aware of the indication of prescribing antibiotics in diabetic patients after dental treatment.

Conclusion

In the present study, result showed that majority of the student has insufficient knowledge about doses, duration, frequency, and antibiotic resistance about the antibiotic. As well as, they were less considered about the side effect and precaution, proper diagnosis. Indication of antibiotic during prescribing to their

patients. As removing of local predominant factor in dental diseases can reduced prescribing of antibiotic. Hence, for need more education program regarding the guideline of antibiotic used in dentistry based on evidence-based medicine and also need to improve the knowledge about antimicrobial resistance.

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